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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,728	11/26/2003	Prathyusha K. Salla	139947YOD GEMS:0257	9781
68174	7590	01/29/2010		
GE HEALTHCARE c/o FLETCHER YODER, PC P.O. BOX 692289 HOUSTON, TX 77269-2289			EXAMINER LAMPRECHT, JOEL	
			ART UNIT 3737	PAPER NUMBER
			MAIL DATE 01/29/2010	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/723,728

**Applicant(s)**

SALLA ET AL.

**Examiner**

JOEL M. LAMPRECHT

**Art Unit**

3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 7, 9-18, 20, 22-31, 33, 35, 37-41 and 43-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 9-18, 20, 22-31, 33, 35, 37-41 and 43-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/15/10
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5, 7, 9-18, 20, 22-31, 33, 35, 37-41, 43, 45, 47, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bayer et al (US 7,529,431 B2) in view of Hossack (6,014,473 of record). Bayer et al disclose a method for acquisition of rotational ultrasound data of an organ for derivation of 3d motion data for that organ. One and two-dimensional image data is captured over a time period and from specific relative locations with respect to the target, including acquisition of perpendicular data around a target area or organ within the body. These acquisitions (Fig 3-4) create partial image areas in 2d planes which are reconstructed to form 3d data. The data

uses intersecting planes to reconstruct multi-dimensional representations of the motion of an organ within the body.

Bayer et al discloses the above-mentioned 1d to 3d data acquisition, but does not disclose how combinations of data and validation of data are performed via vectors. The attention here is directed to the Hossack reference of record, which discloses derivation of motion vectors from motion data as a transducer is rotated or otherwise swept across an image area, and also validation of data using another sensor-based methodology (Fig 21). Hossack discloses incorporation of relative positional data, with the motion data derived from imagers/sensors to provide motion vectors and generate 3d motion data from original datasets. As understood now, the validation of data of Figure 21 and the corresponding disclosure provides for a reference of absolute position of the imager/sensors during operation. As the device of Hossack sweeps over an area, a series of vectors (Fig 13-14) are derived producing planar vectors from the motion data at that position. As shown within Figure 13 and the corresponding disclosure, 2 sets of motion vectors are derived from each tracking array, and a third set of motion vectors is derived from a data-based average or mathematical analysis of the motion data to acquire a third set of motion data (Col 18 line 20-Col 19 Line 50, Col 14 Line 55-Col 15 Line 30, Col 5 Line 45-Col 7 Line 65).

Hossack discloses acquisition of motion along with image data (along a depth axis in cylindrical coordinates, Col 9 Line 1-10), first as an unreconstructed set of image data (Col 12 Line 40-Col 13 Line 60), used as a relative measurement, and second as a tool for creating a reconstructed set of image data (Col 15 Line 30-Col 16 Line 40).

Hossack et al disclose that the sensor based methods and system can include an accelerometer or ultrasonic sensors for measurement of motion (Col 7 line 59-65), the use of the sensor based motion determination system to provide with the imager, three-dimensional motion data for a target region including depth-resolved motion vectors (Col 14 Line 1-35, Col 23 Line 30-Col 24 Line 45), and finally the measurement of annular mechanical motion data (Col 20 Line 30-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the methods and system of Hossack et al with either 1d, 1.5d (as disclosed in Hossack as well) or 2d datasets as the methods of Bayer show how either set of data can be used to create 3 or 4d depictions of internal structures.

Claims 44, 46, 48, and 50 rejected under 35 U.S.C. 103(a) as being unpatentable over Bayer et al (US 7,529,431 B2) in view of Hossack (6,014,473 of record) and in further view of Wilk et al (7,597,665 B2). Bayer et al in view of Hossack discloses what is listed above but fails to disclose sensors which can be affixed to the body. Attention is directed to the system of Wilk et al which discloses that sensors for ultrasound can be affixed to the body for the purpose of performing 3D volumetric data acquisition. It would have been obvious to one of ordinary skill in the art to have utilized a multi-sensor 'vest' or other body-affixed sensor setup of Wilk et al with the transducer/processing of Bayer in view of Hossack for the purpose (Fig 14-19) of providing for ultrasonic imaging of a patient via an ultrasound conductive device which will remain in contact with the patient.

### ***Response to Arguments***

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Regarding the Hossack reference, specific delineation as to how the Hossack reference reads on existing claims will be provided below:

1. Acquisition on 1d motion data: The reference to Bayer et al discloses acquisition of 1d motion data specifically and integration into a 3d motion estimate; however, acquisition of 2d frames of data, along a sweeping axis provides inherently for 1d data in 2 planar directions. The third set of motion data in the Hossack reference is derived as a cross or data-based method.

3. Acquiring one of the sets of data comprises "validating" a set of data using validation motion data (also derivation of 3 sets of motion vectors). Hossack provides in Fig 21, a magnetic, ultrasound, or other sensor for yielding absolute positional data relative to the other sensors of the device. Cross-correlation of the data along the azimuth direction (Col 12 Line 40-Col 14 line 20) yields the motion vectors (additionally Col 14 Line 55-Col 15 Line 30). The instant application does not *require* all 3 sets of data to be directly from a sensor/imager (only 2), and as such, the third dimension (and thus set of motion vectors) can be derived from data such as the cross-correlation disclosed in Hossack.

Further delineation includes the interchangeable use of sensor-based, image-based, etc with respect to the Hossack reference. To one of normal skill in the art, it is understood that an ultrasound transducer is a sensor, imager, and is sensitive to motion. As all imaging procedures which are performed over time are also sensitive to motion on at least a self-referential level.

Examiner, in responding to the last response, mistook the definition of "validation" data and has hereby included the Hossack reference to include such data.

Furthermore, it is to be understood that the Hossack reference is working in a spherical/cylindrical coordinate system, rather than Cartesian.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL M. LAMPRECHT whose telephone number is (571)272-3250. The examiner can normally be reached on 8:30-5:00 Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571) 272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRIAN CASLER/  
Supervisory Patent Examiner, Art  
Unit 3737

JML